map every unique instances into an instance class except for those cells in arrays. Once the cell instances are partitioned into instance classes, the circuit, i.e., each of the cell instances, is sized (804) using any of a variety of sizing tools such as, for example, the sizing tool described above. Because each of the cell instances is sized in this step without regard to the

5   cost of introducing additional cell subtypes, a large number of cell subtypes, i.e., cells of a given type with different transistor sizes, will typically result. As mentioned above, the technique by which the circuit is sized is not particularly relevant to the most fundamental aspects of the invention, and may correspond to any of a wide variety of commercially available and proprietary integrated physical synthesis technologies.

10   As alluded to above, the designer is constrained by layout and verification resource in the number of subtypes which can be created and be part of the ultimate design. On the other hand, a sufficient number of cell subtypes is desirable to achieve a reasonable level of specialization in transistor sizes. Therefore, according to a specific embodiment of the invention, the various cell subtypes resulting from the sizing of 804 are grouped or merged

15   with reference to a "profit function" (which provides a measure of the benefit to be gained by a particular grouping) to form a smaller set of subtypes (806).

A profit function for use with the present invention may take into account a variety of metrics such as, for example, chip area savings and/or the layout cost associated with the number of subtypes. Different embodiments may consider any or all such metrics, as well as

20   approximations thereof. For example, chip area savings may be determined by performing a test sizing for each grouping decision. Alternatively, to save time, more easily derived rough estimates may be employed. In some exemplary embodiments, layout cost may be ignored. According to others, a rough estimate may be employed.

According to various specific embodiments, a variety of grouping techniques may be

25   employed. According to one such embodiment, potential groupings are determined by